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SEQUENCE LISTING

IAP20 REC'D 10 FEB 2006

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5 <223> Sequence of 9949 bp Sau3AI genomic DNA fragment of *S. bulbocastan*
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29

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 ttt tct gct ctt agc aag gac att gcc gat gtt ctg gtt ttc cta gag 96
 Phe Ser Ala Leu Ser Lys Asp Ile Ala Asp Val Leu Val Phe Leu Glu
 45 20 25 30
 aat gag gaa aat caa aaa gct ctt gac aaa gat caa gtt gaa aag ata 144
 Asn Glu Glu Asn Gln Lys Ala Leu Asp Lys Asp Gln Val Glu Lys Ile
 35 40 45
 50 aaa ttg aaa atg gca ttt att tgt aca tat gtt cag ctt tct tgt tcc 192
 Lys Leu Lys Met Ala Phe Ile Cys Thr Tyr Val Gln Leu Ser Cys Ser
 50 55 60
 55 gat ttt gag cag ttt gaa gat ata atg act aga aaa aga caa gag gtt 240
 Asp Phe Glu Gln Phe Glu Asp Ile Met Thr Arg Lys Arg Gln Glu Val
 65 70 75 80
 60 gag aat ctg ctt caa cca ctt ttg gat gat gat gtc ttt act agc ctc 288
 Glu Asn Leu Leu Gln Pro Leu Leu Asp Asp Asp Val Phe Thr Ser Leu
 85 90 95
 acc agt aat atg gat gac tgt atc agc ttg tat cat cgt tct tat aaa 336
 Thr Ser Asn Met Asp Asp Cys Ile Ser Leu Tyr His Arg Ser Tyr Lys
 65 100 105 110
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30

	115	120	125	
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10	act caa tat gaa gtt ctt cag aat ata tgt ggc aac ata aga gat ttc Thr Gln Tyr Glu Val Leu Gln Asn Ile Cys Gly Asn Ile Arg Asp Phe 145 150 155 160	480		
15	cat ggg ttg ata gtg aat ggt tgc att aag cat gag atg gtt gag aat His Gly Leu Ile Val Asn Gly Cys Ile Lys His Glu Met Val Glu Asn 165 170 175	528		
20	gtc ttr cct ctg ttt caa ctc atg gct gac aga gta gga cac ttc ctt Val Xaa Pro Leu Phe Gln Leu Met Ala Asp Arg Val Gly His Phe Leu 180 185 190	576		
25	tgg gat gat cag act gat gaa gac tct cga ctc tcc gag cta gat gag Trp Asp Asp Gln Thr Asp Glu Asp Ser Arg Leu Ser Glu Leu Asp Glu 195 200 205	624		
30	gat gaa caa aat gat aga gac tct cga ctt ttc aag cta gca cat cta Asp Glu Gln Asn Asp Arg Asp Ser Arg Leu Phe Lys Leu Ala His Leu 210 215 220	672		
35	ctc ttg aag atc gtt ccg gtt gaa ctg gag gtt ata cac ata tgt tat Leu Leu Lys Ile Val Pro Val Glu Leu Glu Val Ile His Ile Cys Tyr 225 230 235 240	720		
40	aca aac ttg aaa gct tca act tca gct gaa gtt gga ctc ttc att aag Thr Asn Leu Lys Ala Ser Thr Ser Ala Glu Val Gly Leu Phe Ile Lys 245 250 255	768		
45	cag ctt cta gaa acc tct cca gat att ctg agg gaa tat cta att cct Gln Leu Leu Glu Thr Ser Pro Asp Ile Leu Arg Glu Tyr Leu Ile Pro 260 265 270	816		
50	ctg caa gag cac atg gta act gtt att acc cct agc act tca ggg gct Leu Gln Glu His Met Val Thr Val Ile Thr Pro Ser Thr Ser Gly Ala 275 280 285	864		
55	cga aac att cat gtc atg atg gaa ttc cta tta ctt att ctt tct gat Arg Asn Ile His Val Met Met Glu Phe Leu Leu Leu Ile Leu Ser Asp 290 295 300	912		
60	atg ccc aag gac ttt att cat cat gac aaa ctt ttt gat ctc ttg gat Met Pro Lys Asp Phe Ile His His Asp Lys Leu Phe Asp Leu Leu Asp 305 310 315 320	960		
65	cgt gtc gga gta ctt acc agg gag gta tca act ctt gta cgt gac ttg Arg Val Gly Val Leu Thr Arg Glu Val Ser Thr Leu Val Arg Asp Leu 325 330 335	1008		
70	gaa gag gaa cca agg aat aaa gag ggt aat aac caa aca aat tgt gca Glu Glu Glu Pro Arg Asn Lys Glu Gly Asn Asn Gln Thr Asn Cys Ala 340 345 350	1056		
75	acc cta gac ttg ctg gaa aat att gaa ctc ctc aag aaa gat ctc aaa Thr Leu Asp Leu Leu Glu Asn Ile Glu Leu Leu Lys Lys Asp Leu Lys 355 360 365	1104		
80	cat gtt tat ctg aaa gcc ctg gat tca tct caa tgt tgc ttc ccc atg His Val Tyr Leu Lys Ala Leu Asp Ser Ser Gln Cys Cys Phe Pro Met 370 375 380	1152		
85	agt gat gga cca ctc ttc atg cat ctt cta cac ata cac tta aat gat Ser Asp Gly Pro Leu Phe Met His Leu Leu His Ile His Leu Asn Asp 385 390 395	1200		

	385	390	395	400	
5	ttg tta gat tct aat gct tat tca att gct ttg ata aag gaa gaa atc Leu Leu Asp Ser Asn Ala Tyr Ser Ile Ala Leu Ile Lys Glu Glu Ile	405	410	415	1248
10	gag ctg gtg aag caa gac ctg aaa ttc ata aga tca ttc ttt gtg gat Glu Leu Val Lys Gln Asp Leu Lys Phe Ile Arg Ser Phe Phe Val Asp	420	425	430	1296
15	gct gag caa gga ttg tat aaa gat ctc tgg gca cgt gtt cta gat gtg Ala Glu Gln Gly Leu Tyr Lys Asp Leu Trp Ala Arg Val Leu Asp Val	435	440	445	1344
20	gct tat gag gca aaa gat gtc ata gat tca att att gtt cga gat aat Ala Tyr Glu Ala Lys Asp Val Ile Asp Ser Ile Ile Val Arg Asp Asn	450	455	460	1392
25	ggg ctc tta cat ctt att ttc tca ctt ccc att acc ata aag aag atc Gly Leu Leu His Leu Ile Phe Ser Leu Pro Ile Thr Ile Lys Lys Ile	465	470	475	1440
30	aaa ctt atc aaa gaa gag atc tct gct tta gat gag aac att ccc aag Lys Leu Ile Lys Glu Glu Ile Ser Ala Leu Asp Glu Asn Ile Pro Lys	485	490	495	1488
35	gac aga ggt cta atc gtt gtg aac tct ccc aag aaa cca gtt gag aga Asp Arg Gly Leu Ile Val Val Asn Ser Pro Lys Lys Pro Val Glu Arg	500	505	510	1536
40	aag tca ttg aca act gat aaa ata act gta ggt ttt gag gag gaa aca Lys Ser Leu Thr Thr Asp Lys Ile Thr Val Gly Phe Glu Glu Glu Thr	515	520	525	1584
45	aac ttg ata ctt aga aag ctc acc agt gga tgg gca gat cta gat gtc Asn Leu Ile Leu Arg Lys Leu Thr Ser Gly Ser Ala Asp Leu Asp Val	530	535	540	1632
50	att tgg atc act ggt atg ccg ggt tca ggt aaa act act ttg gca tac Ile Ser Ile Thr Gly Met Pro Gly Ser Gly Lys Thr Thr Leu Ala Tyr	545	550	555	1680
55	aaa gta tac aat gat aag tca gtt tct agc cgt ttc gac ctt cgt gca Lys Val Tyr Asn Asp Lys Ser Val Ser Ser Arg Phe Asp Leu Arg Ala	565	570	575	1728
60	tgg tgc acg gtc gac caa gga tgt gat gag aag aag ttg ttg aat aca Trp Cys Thr Val Asp Gln Gly Cys Asp Glu Lys Lys Leu Leu Asn Thr	580	585	590	1776
65	att ttc agt caa gtt agt gac tca gat tca aaa ttg agt gag aat att Ile Phe Ser Gln Val Ser Asp Ser Asp Ser Lys Leu Ser Glu Asn Ile	595	600	605	1824
70	gat gtt gct gat aaa tta cgg aaa caa ctg ttt gga aag agg tat ctt Asp Val Ala Asp Lys Leu Arg Lys Gln Leu Phe Gly Lys Arg Tyr Leu	610	615	620	1872
75	att gtc tta gat gac gtg tgg gat act act aca tgg gat gag tta aca Ile Val Leu Asp Asp Val Trp Asp Thr Thr Thr Trp Asp Glu Leu Thr	625	630	635	1920
80	aga cct ttt cct gaa tct aag aaa gga agt agg att att ttg aca act Arg Pro Phe Pro Glu Ser Lys Lys Gly Ser Arg Ile Ile Leu Thr Thr	645	650	655	1968
85	cgg gaa aag gaa gtg gct ttg cat gga aag ctg aac act gat cct ctt Arg Glu Lys Glu Val Ala Leu His Gly Lys Leu Asn Thr Asp Pro Leu				2016

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5	gac ctt cga ttg cta aga cca gat gaa agt tgg gaa cta tta gag aaa Asp Leu Arg Leu Leu Arg Pro Asp Glu Ser Trp Glu Leu Leu Glu Lys 675 680 685	2064		
10	agg gca ttt ggg aat gag agt tgc cct gat gaa cta tta gat gtc ggt Arg Ala Phe Gly Asn Glu Ser Cys Pro Asp Glu Leu Leu Asp Val Gly 690 695 700	2112		
15	aaa gaa ata gcc gaa aat tgt aaa ggg ctt cct ttg gtg gct gat ctg Lys Glu Ile Ala Glu Asn Cys Lys Gly Leu Pro Leu Val Ala Asp Leu 705 710 715 720	2160		
20	att gct gga gtc att gct ggg agg gaa aag aaa agg agt gtg tgg ctt Ile Ala Gly Val Ile Ala Gly Arg Glu Lys Arg Ser Val Trp Leu 725 730 735	2208		
25	gaa gtt caa agt agt ttg agt tct ttt att ttg aac agt gaa gtg gaa Glu Val Gln Ser Ser Leu Ser Ser Phe Ile Leu Asn Ser Glu Val Glu 740 745 750	2256		
30	gtg atg aaa gtt ata gaa tta agt tat gac cat tta cca cat cac ctc Val Met Lys Val Ile Glu Leu Ser Tyr Asp His Leu Pro His His Leu 755 760 765	2304		
35	aag cca tgc ttg ctg tat ttt gca agt ttt ccg aag gac act tca ttg Lys Pro Cys Leu Leu Tyr Phe Ala Ser Phe Pro Lys Asp Thr Ser Leu 770 775 780	2352		
40	aca atc tat gag ttg aat gtt tat ttc ggt gct gaa gga ttt gtg gga Thr Ile Tyr Glu Leu Asn Val Tyr Phe Gly Ala Glu Gly Phe Val Gly 785 790 795 800	2400		
45	aag acg gag atg aac agt atg gaa gaa gtg gtg aag att tat atg gat Lys Thr Glu Met Asn Ser Met Glu Glu Val Val Lys Ile Tyr Met Asp 805 810 815	2448		
50	gat tta att tac agt agc ttg gta att tgt ttc aat gag ata ggt tat Asp Leu Ile Tyr Ser Ser Leu Val Ile Cys Phe Asn Glu Ile Gly Tyr 820 825 830	2496		
55	gca ctg aat ttc caa att cat gat ctt gtg cat gac ttt tgt ttg ata Ala Leu Asn Phe Gln Ile His Asp Leu Val His Asp Phe Cys Leu Ile 835 840 845	2544		
60	aaa gca aga aag gaa aat ttg ttt gat cag ata aga tca agt gct cca Lys Ala Arg Lys Glu Asn Leu Phe Asp Gln Ile Arg Ser Ser Ala Pro 850 855 860	2592		
65	tca gat ttg ttg cct cgt caa att acc att gat tgt gat gag gag gag Ser Asp Leu Leu Pro Arg Gln Ile Thr Ile Asp Cys Asp Glu Glu Glu 865 870 875 880	2640		
70	cac ttt ggg ctt aat ttt gtc atg ttc gat tca aat aag aaa agg cat His Phe Gly Leu Asn Phe Val Met Phe Asp Ser Asn Lys Lys Arg His 885 890 895	2688		
75	tct ggt aaa cac ctc tat tct ttg agg ata att gga gac cag ctg gat Ser Gly Lys His Leu Tyr Ser Leu Arg Ile Ile Gly Asp Gln Leu Asp 900 905 910	2736		
80	gac agt gtt tct gat gca ttt cac cta aga cac ttg agg ctt ctt aga Asp Ser Val Ser Asp Ala Phe His Leu Arg His Leu Arg Leu Leu Arg 915 920 925	2784		
85	gtg ttg gac ctg cat acg tct ttt atc atg gtg aaa gat tct ttg ctg Val Leu Asp Leu His Thr Ser Phe Ile Met Val Lys Asp Ser Leu Leu	2832		

	930	935	940	
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10	caa gtt aaa tat ctg cct ttg tct ttc tca aac ctc tgg aat cta gaa Gln Val Lys Tyr Leu Pro Leu Ser Phe Ser Asn Leu Trp Asn Leu Glu 965 970 975	2928		
15	agc ctg ttt gtg tct acc aac aga tca atc ttg gta cta tta ccg aga Ser Leu Phe Val Ser Thr Asn Arg Ser Ile Leu Val Leu Leu Pro Arg 980 985 990	2976		
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25	ttc ttt gat atg gat gca gat gaa tca ata ttg ata gca gag gac Phe Phe Asp Met Asp Ala Asp Glu Ser Ile Leu Ile Ala Glu Asp 1010 1015 1020	3069		
30	aca aag tta gag aac ttg aga ata tta acg gaa ctg ttg att tcc Thr Lys Leu Glu Asn Leu Arg Ile Leu Thr Glu Leu Leu Ile Ser 1025 1030 1035	3114		
35	tat tcg aaa gat aca aag aat att ttc aaa agg ttt ccc aat ctt Tyr Ser Lys Asp Thr Lys Asn Ile Phe Lys Arg Phe Pro Asn Leu 1040 1045 1050	3159		
40	cag ttg ctt tca ttt gaa ctc aag gag tca tgg gat tat tca aca Gln Leu Leu Ser Phe Glu Leu Lys Glu Ser Trp Asp Tyr Ser Thr 1055 1060 1065	3204		
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55	tcc tct gta gcg aca aat cgg ccg tgg gat ttt cac ttc cct tca Ser Ser Val Ala Thr Asn Arg Pro Trp Asp Phe His Phe Pro Ser 1100 1105 1110	3339		
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65	tca cta tca aca ata gcg aga ctg ccc aac ctt gaa gag ttg tcc Ser Leu Ser Thr Ile Ala Arg Leu Pro Asn Leu Glu Glu Leu Ser 1130 1135 1140	3429		
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75	gaa gac acc ttt gag aat ctc aaa ttt ttg aac ttc aat caa gtt Glu Asp Thr Phe Glu Asn Leu Lys Phe Leu Asn Phe Asn Gln Val 1160 1165 1170	3519		
80	agt att tcc aag tgg gag gtt gga gag gaa tcc ttc ccc aat ctt Ser Ile Ser Lys Trp Glu Val Gly Glu Glu Ser Phe Pro Asn Leu 1175 1180 1185	3564		
85	gag aaa tta aaa ctg cgg gga tgt cat aag cta gag gag att cca Glu Lys Leu Lys Leu Arg Gly Cys His Lys Leu Glu Glu Ile Pro 1190 1195 1200	3609		

	1190	1195	1200	
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	Pro Ser Phe Gly Asp Ile Tyr	Ser Leu Lys Ser Ile	Lys Ile Val	
	1205	1210	1215	
10	aag agt cct caa ctt gaa gat	tct gct ctc aaa att	aag gaa tac	3699
	Lys Ser Pro Gln Leu Glu Asp	Ser Ala Leu Lys Ile	Lys Glu Tyr	
	1220	1225	1230	
	gct gaa gat atg agg gga ggg	gac gag ctt cag atc	ctt ggc caa	3744
	Ala Glu Asp Met Arg Gly Gly	Asp Glu Leu Gln Ile	Leu Gly Gln	
	1235	1240	1245	
15	aag aat atc ccc tta ttt aag tag			3768
	Lys Asn Ile Pro Leu Phe Lys			
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	1 5 10 15			
45	Phe Ser Ala Leu Ser Lys Asp Ile Ala Asp Val Leu Val Phe Leu Glu			
	20 25 30			
50	Asn Glu Glu Asn Gln Lys Ala Leu Asp Lys Asp Gln Val Glu Lys Ile			
	35 40 45			
55	Lys Leu Lys Met Ala Phe Ile Cys Thr Tyr Val Gln Leu Ser Cys Ser			
	50 55 60			
60	Asp Phe Glu Gln Phe Glu Asp Ile Met Thr Arg Lys Arg Gln Glu Val			
	65 70 75 80			
65	Glu Asn Leu Leu Gln Pro Leu Leu Asp Asp Asp Val Phe Thr Ser Leu			
	85 90 95			
	Thr Ser Asn Met Asp Asp Cys Ile Ser Leu Tyr His Arg Ser Tyr Lys			
	100 105 110			
	Ser Asp Ala Ile Met Met Asp Glu Gln Leu Asp Phe Leu Leu Leu Asn			

35

	115	120	125
5	Leu Tyr His 130	Leu Ser Lys His His 135	Ala Glu Lys Ile Phe Pro Gly Val 140
10	Thr Gln Tyr 145	Glu Val Leu Gln Asn Ile 150	Cys Gly Asn Ile Arg Asp Phe 155 160
15	His Gly Leu Ile 165	Val Asn Gly Cys Ile 170	Lys His Glu Met Val Glu Asn 175
20	Val Xaa Pro 180	Leu Phe Gln Leu Met 185	Ala Asp Arg Val Gly His Phe Leu 190
25	Trp Asp Asp 195	Gln Thr Asp Glu Asp Ser Arg 200	Leu Ser Glu Leu Asp Glu 205
30	Asp Glu Gln 210	Asn Asp Arg Asp Ser Arg 215	Leu Phe Lys Leu Ala His Leu 220
35	Leu Leu Lys Ile 225	Val Pro Val Glu Leu Glu 230	Val Ile His Ile Cys Tyr 235 240
40	Thr Asn Leu Lys 245	Ala Ser Thr Ser Ala 250	Glu Val Gly Leu Phe Ile Lys 255
45	Gln Leu Leu 260	Glu Thr Ser Pro Asp 265	Ile Leu Arg Glu Tyr Leu Ile Pro 270
50	Leu Gln Glu 275	His Met Val Thr Val 280	Ile Thr Pro Ser Thr Ser Gly Ala 285
55	Arg Asn Ile 290	His Val Met Met Glu Phe 295	Leu Leu Leu Ile Leu Ser Asp 300
60	Met Pro Lys 305	Asp Phe Ile His His 310	Asp Lys Leu Phe Asp Leu Leu Asp 315 320
65	Arg Val Gly 325	Val Leu Thr Arg Glu Val 330	Ser Thr Leu Val Arg Asp Leu 335
70	Glu Glu Glu 340	Pro Arg Asn Lys Glu 345	Gly Asn Asn Gln Thr Asn Cys Ala 350
75	Thr Leu Asp 355	Leu Leu Glu Asn Ile 360	Glu Leu Leu Lys Lys Asp Leu Lys 365
80	His Val Tyr 370	Leu Lys Ala Leu Asp 375	Ser Ser Gln Cys Cys Phe Pro Met 380
85	Ser Asp Gly 385	Pro Leu Phe Met His 390	Leu Leu His Ile His Leu Asn Asp 395

	385	390	395	400
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10	Glu Leu Val Lys Gln Asp Leu Lys Phe Ile Arg Ser Phe Phe Val Asp	420	425	430
15	Ala Glu Gln Gly Leu Tyr Lys Asp Leu Trp Ala Arg Val Leu Asp Val	435	440	445
20	Ala Tyr Glu Ala Lys Asp Val Ile Asp Ser Ile Ile Val Arg Asp Asn	450	455	460
25	Gly Leu Leu His Leu Ile Phe Ser Leu Pro Ile Thr Ile Lys Lys Ile	465	470	475
30	Lys Leu Ile Lys Glu Glu Ile Ser Ala Leu Asp Glu Asn Ile Pro Lys	485	490	495
35	Asp Arg Gly Leu Ile Val Val Asn Ser Pro Lys Lys Pro Val Glu Arg	500	505	510
40	Lys Ser Leu Thr Thr Asp Lys Ile Thr Val Gly Phe Glu Glu Glu Thr	515	520	525
45	Asn Leu Ile Leu Arg Lys Leu Thr Ser Gly Ser Ala Asp Leu Asp Val	530	535	540
50	Ile Ser Ile Thr Gly Met Pro Gly Ser Gly Lys Thr Thr Leu Ala Tyr	545	550	555
55	Lys Val Tyr Asn Asp Lys Ser Val Ser Ser Arg Phe Asp Leu Arg Ala	565	570	575
60	Trp Cys Thr Val Asp Gln Gly Cys Asp Glu Lys Lys Leu Leu Asn Thr	580	585	590
65	Ile Phe Ser Gln Val Ser Asp Ser Asp Ser Lys Leu Ser Glu Asn Ile	595	600	605
70	Asp Val Ala Asp Lys Leu Arg Lys Gln Leu Phe Gly Lys Arg Tyr Leu	610	615	620
75	Ile Val Leu Asp Asp Val Trp Asp Thr Thr Thr Trp Asp Glu Leu Thr	625	630	635
80	Arg Pro Phe Pro Glu Ser Lys Lys Gly Ser Arg Ile Ile Leu Thr Thr	645	650	655
85	Arg Glu Lys Glu Val Ala Leu His Gly Lys Leu Asn Thr Asp Pro Leu			

	660	665	670
5	Asp Leu Arg Leu Leu Arg Pro Asp Glu Ser Trp Glu Leu Leu Glu Lys 675 680 685		
10	Arg Ala Phe Gly Asn Glu Ser Cys Pro Asp Glu Leu Leu Asp Val Gly 690 695 700		
15	Lys Glu Ile Ala Glu Asn Cys Lys Gly Leu Pro Leu Val Ala Asp Leu 705 710 715 720		
20	Ile Ala Gly Val Ile Ala Gly Arg Glu Lys Lys Arg Ser Val Trp Leu 725 730 735		
25	Glu Val Gln Ser Ser Leu Ser Ser Phe Ile Leu Asn Ser Glu Val Glu 740 745 750		
30	Val Met Lys Val Ile Glu Leu Ser Tyr Asp His Leu Pro His His Leu 755 760 765		
35	Lys Pro Cys Leu Leu Tyr Phe Ala Ser Phe Pro Lys Asp Thr Ser Leu 770 775 780		
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45	Lys Thr Glu Met Asn Ser Met Glu Glu Val Val Lys Ile Tyr Met Asp 805 810 815		
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	His Phe Gly Leu Asn Phe Val Met Phe Asp Ser Asn Lys Lys Arg His 885 890 895		
	Ser Gly Lys His Leu Tyr Ser Leu Arg Ile Ile Gly Asp Gln Leu Asp 900 905 910		
	Asp Ser Val Ser Asp Ala Phe His Leu Arg His Leu Arg Leu Leu Arg 915 920 925		
	Val Leu Asp Leu His Thr Ser Phe Ile Met Val Lys Asp Ser Leu Leu		

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50	aat gag gaa aat caa aaa gct ctt gac aaa gat caa gtt gaa aag cta Asn Glu Glu Asn Gln Lys Ala Leu Asp Lys Asp Gln Val Glu Lys Leu 35 40 45			144
55	aaa ttg aaa atg gca ttt att tgt aca tat gtt cag ctt tct tat tcc Lys Leu Lys Met Ala Phe Ile Cys Thr Tyr Val Gln Leu Ser Tyr Ser 50 55 60			192
60	gat ttt gag cag ttt gaa gat ata atg act aga aat aga caa gag gtt Asp Phe Glu Gln Phe Glu Asp Ile Met Thr Arg Asn Arg Gln Glu Val 65 70 75 80			240
	gag aat ctg ctt caa tca ctt ttg gat gat gat gtc ctt act agc ctc Glu Asn Leu Leu Gln Ser Leu Leu Asp Asp Asp Val Leu Thr Ser Leu 85 90 95			288
65	acc agt aat atg gat gac tgt atc agc ttg tat cat cgt tct tat aaa Thr Ser Asn Met Asp Asp Cys Ile Ser Leu Tyr His Arg Ser Tyr Lys 100 105 110			336

40

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	Leu Tyr His Leu Ser Lys His His Ala Glu Lys Ile Phe Pro Gly Val	
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	His Gly Leu Ile Leu Asn Gly Cys Ile Lys His Glu Met Val Glu Asn	
	165 170 175	
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	Val Leu Pro Leu Phe Gln Leu Met Ala Glu Arg Val Gly His Phe Leu	
	180 185 190	
25	tgg gag gat cag act gat gaa gac tct cgg ctc tcc gag cta gat gag	624
	Trp Glu Asp Gln Thr Asp Glu Asp Ser Arg Leu Ser Glu Leu Asp Glu	
	195 200 205	
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	Arg Asn Ile His Val Met Met Glu Phe Leu Leu Ile Leu Ser Asp	
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	Met Pro Lys Asp Phe Ile His His Asp Lys Leu Phe Asp Leu Leu Ala	
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	His Val Gly Thr Leu Thr Arg Glu Val Ser Thr Leu Val Arg Asp Leu	
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	340 345 350	
75	acc cta gac ttg ctg gaa aat att gaa ctc ctc aag aaa gat ctc aaa	1104
	Thr Leu Asp Leu Leu Glu Asn Ile Glu Leu Leu Lys Lys Asp Leu Lys	
	355 360 365	
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	His Val Tyr Leu Lys Ala Pro Asn Ser Ser Gln Cys Cys Phe Pro Met	
	370 375 380	

41

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	Leu Leu Asp Ser Asn Ala Tyr Ser Ile Ser Leu Ile Lys Glu Glu Ile	
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	Glu Leu Val Ser Gln Glu Leu Glu Phe Ile Arg Ser Phe Phe Gly Asp	
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	Ala Trp Cys Thr Val Asp Gln Gly Tyr Asp Asp Lys Lys Leu Leu Asp	
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	Leu Ile Ala Gly Val Ile Ala Gly Arg Glu Lys Lys Arg Ser Val Trp	
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	835 840 845	
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	Ile Lys Ala Arg Lys Glu Asn Leu Phe Asp Arg Ile Arg Ser Ser Ala	
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	915 920 925	

43

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60 Thr Ser Asn Met Asp Asp Cys Ile Ser Leu Tyr His Arg Ser Tyr Lys
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65 Leu Tyr His Leu Ser Lys His His Ala Glu Lys Ile Phe Pro Gly Val
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	1 5 10 15		
55	ctc aaa ggg gaa ctt gta ttg ctt ttc ggt ttt caa gat gag ttc caa		96
	Leu Lys Gly Glu Leu Val Leu Leu Phe Gly Phe Gln Asp Glu Phe Gln		
	20 25 30		
60	agg ctt tca agc atg ttt tct aca att caa gcc gtc ctt gaa gat gct		144
	Arg Leu Ser Ser Met Phe Ser Thr Ile Gln Ala Val Leu Glu Asp Ala		
	35 40 45		
	cag gag aag caa ctc aac aac aag cct cta gaa aat tgg ttg caa aaa		192
	Gln Glu Lys Gln Leu Asn Asn Lys Pro Leu Glu Asn Trp Leu Gln Lys		
65	50 55 60		
	ctc aat gct gct aca tat gaa gtc gat gac atc ttg gat gaa tat aaa		240
	Leu Asn Ala Ala Thr Tyr Glu Val Asp Asp Ile Leu Asp Glu Tyr Lys		

65	70	75	80	
acc aag gcc aca aga ttc tcc cag tct gaa tat ggc cgt tat cat cca				288
Thr Lys Ala Thr Arg Phe Ser Gln Ser Glu Tyr Gly Arg Tyr His Pro	85	90	95	
5				
aag gtt atc cct ttc cgt cac aag gtc ggg aaa agg atg gac caa gtg				336
Lys Val Ile Pro Phe Arg His Lys Val Gly Lys Arg Met Asp Gln Val	100	105	110	
10				
atg aaa aaa cta aag gca att gct gag gaa aga aag aat ttt cat ttg				384
Met Lys Lys Leu Lys Ala Ile Ala Glu Glu Arg Lys Asn Phe His Leu	115	120	125	
15				
cac gaa aaa att gta gag aga caa gct gtt aga cgg gaa aca ggt tct				432
His Glu Lys Ile Val Glu Arg Gln Ala Val Arg Glu Thr Gly Ser	130	135	140	
20				
gta tta acc gaa ccg cag gtt tat gga aga gac aaa gag aaa gat gag				480
Val Leu Thr Glu Pro Gln Val Tyr Gly Arg Asp Lys Glu Lys Asp Glu	145	150	155	160
25				
ata gtg aaa atc cta ata aac aat gtt agt gat gcc caa cac ctt tca				528
Ile Val Lys Ile Leu Ile Asn Asn Val Ser Asp Ala Gln His Leu Ser	165	170	175	
30				
gtc ctc cca ata ctt ggt atg ggg gga tta gga aaa acg act ctt gcc				576
Val Leu Pro Ile Leu Gly Met Gly Gly Leu Gly Lys Thr Thr Leu Ala	180	185	190	
35				
caa atg gtc ttc aat gac cag aga gtt act gag cat ttc cat tcc aaa				624
Gln Met Val Phe Asn Asp Gln Arg Val Thr Glu His Phe His Ser Lys	195	200	205	
40				
ata tgg att tgt gtc tcg gaa gat ttt gat gag aag agg tta ata aag				672
Ile Trp Ile Cys Val Ser Glu Asp Phe Asp Glu Lys Arg Leu Ile Lys	210	215	220	
45				
gca att gta gaa tct att gaa gga agg cca cta ctt ggt gag atg gac				720
Ala Ile Val Glu Ser Ile Glu Gly Arg Pro Leu Leu Gly Glu Met Asp	225	230	235	240
50				
ttg gct cca ctt caa aag aag ctt cag gag ttg ctg aat gga aaa aga				768
Leu Ala Pro Leu Gln Lys Lys Leu Gln Glu Leu Leu Asn Gly Lys Arg	245	250	255	
55				
tac ttg ctt gtc tta gat gat gtt tgg aat gaa gat caa cag aag tgg				816
Tyr Leu Leu Val Leu Asp Asp Val Trp Asn Glu Asp Gln Gln Lys Trp	260	265	270	
60				
gct aat tta aga gca gtc ttg aag gtt gga gca agt ggt gct tct gtt				864
Ala Asn Leu Arg Ala Val Leu Lys Val Gly Ala Ser Gly Ala Ser Val	275	280	285	
65				
cta acc act act cgt ctt gaa aag gtt gga tca att atg gga aca ttg				912
Leu Thr Thr Thr Arg Leu Glu Lys Val Gly Ser Ile Met Gly Thr Leu	290	295	300	
70				
caa cca tat gaa ctg tca aat ctg tct caa gaa gat tgt tgg ttg ttg				960
Gln Pro Tyr Glu Leu Ser Asn Leu Ser Gln Glu Asp Cys Trp Leu Leu	305	310	315	320
75				
ttc atg caa cgt gca ttt gga cac caa gaa gaa ata aat cca aac ctt				1008
Phe Met Gln Arg Ala Phe Gly His Gln Glu Glu Ile Asn Pro Asn Leu	325	330	335	
80				
gtg gca atc gga aag gag att gtg aaa aaa agt ggt ggt gtg cct cta				1056
Val Ala Ile Gly Lys Glu Ile Val Lys Lys Ser Gly Gly Val Pro Leu				

	340	345	350	
5	gca gcc aaa act ctt gga ggt att ttg tgc ttc aag aga gaa gaa aga Ala Ala Lys Thr Leu Gly Gly Ile Leu Cys Phe Lys Arg Glu Glu Arg 355 360 365	1104		
10	gca tgg gaa cat gtg aga gac agt ccg att tgg aat ttg cct caa gat Ala Trp Glu His Val Arg Asp Ser Pro Ile Trp Asn Leu Pro Gln Asp 370 375 380	1152		
15	gaa agt tct att ctg cct gcc ctg agg ctt agt tac cat caa ctt cta Glu Ser Ser Ile Leu Pro Ala Leu Arg Leu Ser Tyr His Gln Leu Pro 385 390 395 400	1200		
20	ctt gat ttg aaa caa tgc ttt gcg tat tgt gcg gtg ttc cca aag gat Leu Asp Leu Lys Gln Cys Phe Ala Tyr Cys Ala Val Phe Pro Lys Asp 405 410 415	1248		
25	gcc aaa atg gaa aaa gaa aag cta atc tct ctc tgg atg gcg cat ggt Ala Lys Met Glu Lys Glu Lys Leu Ile Ser Leu Trp Met Ala His Gly 420 425 430	1296		
30	ttt ctt tta tca aaa gga aac atg gag cta gag gat gtg ggc gat gaa Phe Leu Leu Ser Lys Gly Asn Met Glu Leu Glu Asp Val Gly Asp Glu 435 440 445	1344		
35	gta tgg aaa gaa tta tac ttg agg tct ttt ttc caa gag att gaa gtt Val Trp Lys Glu Leu Tyr Leu Arg Ser Phe Phe Gln Glu Ile Glu Val 450 455 460	1392		
40	aaa gat ggt aaa act tat ttc aag atg cat gat ctc atc cat gat ttg Lys Asp Gly Lys Thr Tyr Phe Lys Met His Asp Leu Ile His Asp Leu 465 470 475 480	1440		
45	gca aca tct ctg ttt tca gca aac aca tca agc agc aat atc cgt gaa Ala Thr Ser Leu Phe Ser Ala Asn Thr Ser Ser Ser Asn Ile Arg Glu 485 490 495	1488		
50	ata aat aaa cac agt tac aca cat atg atg tcc att ggt ttc gcc gaa Ile Asn Lys His Ser Tyr Thr His Met Met Ser Ile Gly Phe Ala Glu 500 505 510	1536		
55	gtg gtg ttt ttt tac act ctt ccc ccc ttg gaa aag ttt atc tcg tta Val Val Phe Phe Tyr Thr Leu Pro Pro Leu Glu Lys Phe Ile Ser Leu 515 520 525	1584		
60	aga gtg ctt aat cta ggt gat tcg aca ttt aat aag tta cca tct tcc Arg Val Leu Asn Leu Gly Asp Ser Thr Phe Asn Lys Leu Pro Ser Ser 530 535 540	1632		
65	att gga gat cta gta cat tta aga tac ttg aac ctg tat ggc agt ggc Ile Gly Asp Leu Val His Leu Arg Tyr Leu Asn Leu Tyr Gly Ser Gly 545 550 555 560	1680		
70	atg cgt agt ctt cca aag cag tta tgc aag ctt caa aat ctg caa act Met Arg Ser Leu Pro Lys Gln Leu Cys Lys Leu Gln Asn Leu Gln Thr 565 570 575	1728		
75	ctt gat cta caa tat tgc acc aag ctt tgt tgt ttg cca aaa gaa aca Leu Asp Leu Gln Tyr Cys Thr Lys Leu Cys Cys Leu Pro Lys Glu Thr 580 585 590	1776		
80	agt aaa ctt ggt agt ctc cga aat ctt tta ctt gat ggt agc cag tca Ser Lys Leu Gly Ser Leu Arg Asn Leu Leu Leu Asp Gly Ser Gln Ser 595 600 605	1824		
85	ttg act tgt atg cca cca agg ata gga tca ttg aca tgc ctt aag act Leu Thr Cys Met Pro Pro Arg Ile Gly Ser Leu Thr Cys Leu Lys Thr	1872		

	610	615	620	
5	cta ggt caa ttt gtt gtt gga agg aag aaa ggt tat caa ctt ggt gaa Leu Gly Gln Phe Val Val Gly Arg Lys Lys Gly Tyr Gln Leu Gly Glu 625 630 635 640			1920
10	cta gga aac cta aat ctc tat ggc tca att aaa atc tcg cat ctt gag Leu Gly Asn Leu Asn Leu Tyr Gly Ser Ile Lys Ile Ser His Leu Glu 645 650 655			1968
15	aga gtg aag aat gat aag gac gca aaa gaa gcc aat tta tct gca aaa Arg Val Lys Asn Asp Lys Asp Ala Lys Glu Ala Asn Leu Ser Ala Lys 660 665 670			2016
20	ggg aat ctg cat tct tta agc atg agt tgg aat aac ttt gga cca cat Gly Asn Leu His Ser Leu Ser Met Ser Trp Asn Asn Phe Gly Pro His 675 680 685			2064
25	ata tat gaa tca gaa gaa gtt aaa gtg ctt gaa gcc ctc aaa cca cac Ile Tyr Glu Ser Glu Glu Val Lys Val Leu Glu Ala Leu Lys Pro His 690 695 700			2112
30	tcc aat ctg act tct tta aaa atc tat ggc ttc aga gga atc cat ctc Ser Asn Leu Thr Ser Leu Lys Ile Tyr Gly Phe Arg Gly Ile His Leu 705 710 715 720			2160
35	cca gag tgg atg aat cac tca gta ttg aaa aat att gtc tct att cta Pro Glu Trp Met Asn His Ser Val Leu Lys Asn Ile Val Ser Ile Leu 725 730 735			2208
40	att agc aac ttc aga aac tgc tca tgc tta cca ccc ttt ggt gat ctg Ile Ser Asn Phe Arg Asn Cys Ser Cys Leu Pro Pro Phe Gly Asp Leu 740 745 750			2256
45	cct tgt cta gaa agt cta gag tta cac tgg ggg tct gcg gat gtg gag Pro Cys Leu Glu Ser Leu Glu Leu His Trp Gly Ser Ala Asp Val Glu 755 760 765			2304
50	tat gtt gaa gaa gtg gat att gat gtt cat tct gga ttc ccc aca aga Tyr Val Glu Glu Val Asp Ile Asp Val His Ser Gly Phe Pro Thr Arg 770 775 780			2352
55	ata agg ttt cca tcc ttg agg aaa ctt gat ata tgg gac ttt ggt agt Ile Arg Phe Pro Ser Leu Arg Lys Leu Asp Ile Trp Asp Phe Gly Ser 785 790 795 800			2400
60	ctg aaa gga ttg ctg aaa aag gaa gga gaa gag caa ttc cct gtg ctt Leu Lys Gly Leu Leu Lys Lys Glu Gly Glu Glu Gln Phe Pro Val Leu 805 810 815			2448
65	gaa gag atg ata att cac gag tgc cct ttt ctg acc ctt tct tct aat Glu Glu Met Ile Ile His Glu Cys Pro Phe Leu Thr Leu Ser Ser Asn 820 825 830			2496
70	ctt agg gct ctt act tcc ctc aga att tgc tat aat aaa gta gct act Leu Arg Ala Leu Thr Ser Leu Arg Ile Cys Tyr Asn Lys Val Ala Thr 835 840 845			2544
75	tca ttc cca gaa gag atg ttc aaa aac ctt gca aat ctc aaa tac ttg Ser Phe Pro Glu Glu Met Phe Lys Asn Leu Ala Asn Leu Lys Tyr Leu 850 855 860			2592
80	aca atc tct cgg tgc aat aat ctc aaa gag ctg cct acc agc ttg gct Thr Ile Ser Arg Cys Asn Asn Leu Lys Glu Leu Pro Thr Ser Leu Ala 865 870 875 880			2640
85	agt ctg aat gct ttg aaa agt cta aaa att caa ttg tgt tgc gca cta Ser Leu Asn Ala Leu Lys Ser Leu Lys Ile Gln Leu Cys Cys Ala Leu 885 890 895 900			2688

82

	885	890	895	
5	gag agt ctc cct gag gaa ggg ctg gaa ggt tta tct tca ctc aca gag Glu Ser Leu Pro Glu Glu Gly Leu Glu Gly Leu Ser Ser Leu Thr Glu 900 905 910	2736		
10	tta ttt gtt gaa cac tgt aac atg cta aaa tgt tta cca gag gga ttg Leu Phe Val Glu His Cys Asn Met Leu Lys Cys Leu Pro Glu Gly Leu 915 920 925	2784		
15	cag cac cta aca acc ctc aca agt tta aaa att cgg gga tgt cca caa Gln His Leu Thr Thr Leu Thr Ser Leu Lys Ile Arg Gly Cys Pro Gln 930 935 940	2832		
20	ctg atc aag cgg tgt gag aag gga ata gga gaa gac tgg cac aaa att Leu Ile Lys Arg Cys Glu Lys Gly Ile Gly Glu Asp Trp His Lys Ile 945 950 955 960	2880		
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45	Arg Leu Ser Ser Met Phe Ser Thr Ile Gln Ala Val Leu Glu Asp Ala 35 40 45			
50	Gln Glu Lys Gln Leu Asn Asn Lys Pro Leu Glu Asn Trp Leu Gln Lys 50 55 60			
55	Leu Asn Ala Ala Thr Tyr Glu Val Asp Asp Ile Leu Asp Glu Tyr Lys 65 70 75 80			
60	Thr Lys Ala Thr Arg Phe Ser Gln Ser Glu Tyr Gly Arg Tyr His Pro 85 90 95			
65	Lys Val Ile Pro Phe Arg His Lys Val Gly Lys Arg Met Asp Gln Val 100 105 110			
	Met Lys Lys Leu Lys Ala Ile Ala Glu Glu Arg Lys Asn Phe His Leu 115 120 125			
	His Glu Lys Ile Val Glu Arg Gln Ala Val Arg Arg Glu Thr Gly Ser			

	130		135		140
5	Val 145	Leu Thr Glu Pro Gln	Val Tyr Gly Arg Asp Lys Glu Lys Asp Glu 150 155 160		
10	Ile Val Lys Ile Leu Ile Asn Asn Val Ser Asp Ala Gln His Leu Ser 165 170 175				
	Val Leu Pro Ile Leu Gly Met Gly Gly Leu Gly Lys Thr Thr Leu Ala 180 185 190				
15	Gln Met Val Phe Asn Asp Gln Arg Val Thr Glu His Phe His Ser Lys 195 200 205				
20	Ile Trp Ile Cys Val Ser Glu Asp Phe Asp Glu Lys Arg Leu Ile Lys 210 215 220				
25	Ala Ile Val Glu Ser Ile Glu Gly Arg Pro Leu Leu Gly Glu Met Asp 225 230 235 240				
30	Leu Ala Pro Leu Gln Lys Lys Leu Gln Glu Leu Leu Asn Gly Lys Arg 245 250 255				
	Tyr Leu Leu Val Leu Asp Asp Val Trp Asn Glu Asp Gln Gln Lys Trp 260 265 270				
35	Ala Asn Leu Arg Ala Val Leu Lys Val Gly Ala Ser Gly Ala Ser Val 275 280 285				
40	Leu Thr Thr Thr Arg Leu Glu Lys Val Gly Ser Ile Met Gly Thr Leu 290 295 300				
45	Gln Pro Tyr Glu Leu Ser Asn Leu Ser Gln Glu Asp Cys Trp Leu Leu 305 310 315 320				
50	Phe Met Gln Arg Ala Phe Gly His Gln Glu Glu Ile Asn Pro Asn Leu 325 330 335				
	Val Ala Ile Gly Lys Glu Ile Val Lys Lys Ser Gly Gly Val Pro Leu 340 345 350				
55	Ala Ala Lys Thr Leu Gly Gly Ile Leu Cys Phe Lys Arg Glu Glu Arg 355 360 365				
60	Ala Trp Glu His Val Arg Asp Ser Pro Ile Trp Asn Leu Pro Gln Asp 370 375 380				
65	Glu Ser Ser Ile Leu Pro Ala Leu Arg Leu Ser Tyr His Gln Leu Pro 385 390 395 400				
	Leu Asp Leu Lys Gln Cys Phe Ala Tyr Cys Ala Val Phe Pro Lys Asp				

84

	405	410	415
5	Ala Lys Met Glu Lys Glu Lys Leu Ile Ser Leu Trp Met Ala His Gly 420 425 430		
10	Phe Leu Leu Ser Lys Gly Asn Met Glu Leu Glu Asp Val Gly Asp Glu 435 440 445		
15	Val Trp Lys Glu Leu Tyr Leu Arg Ser Phe Phe Gln Glu Ile Glu Val 450 455 460		
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25	Ala Thr Ser Leu Phe Ser Ala Asn Thr Ser Ser Ser Asn Ile Arg Glu 485 490 495		
30	Ile Asn Lys His Ser Tyr Thr His Met Met Ser Ile Gly Phe Ala Glu 500 505 510		
35	Val Val Phe Phe Tyr Thr Leu Pro Pro Leu Glu Lys Phe Ile Ser Leu 515 520 525		
40	Arg Val Leu Asn Leu Gly Asp Ser Thr Phe Asn Lys Leu Pro Ser Ser 530 535 540		
45	Ile Gly Asp Leu Val His Leu Arg Tyr Leu Asn Leu Tyr Gly Ser Gly 545 550 555 560		
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60	Ser Lys Leu Gly Ser Leu Arg Asn Leu Leu Leu Asp Gly Ser Gln Ser 595 600 605		
65	Leu Thr Cys Met Pro Pro Arg Ile Gly Ser Leu Thr Cys Leu Lys Thr 610 615 620		
70	Leu Gly Gln Phe Val Val Gly Arg Lys Lys Gly Tyr Gln Leu Gly Glu 625 630 635 640		
75	Leu Gly Asn Leu Asn Leu Tyr Gly Ser Ile Lys Ile Ser His Leu Glu 645 650 655		
80	Arg Val Lys Asn Asp Lys Asp Ala Lys Glu Ala Asn Leu Ser Ala Lys 660 665 670		
85	Gly Asn Leu His Ser Leu Ser Met Ser Trp Asn Asn Phe Gly Pro His		

	675	680	685
5	Ile Tyr Glu Ser Glu Glu Val Lys Val Leu Glu Ala Leu Lys Pro His 690 695 700		
10	Ser Asn Leu Thr Ser Leu Lys Ile Tyr Gly Phe Arg Gly Ile His Leu 705 710 715 720		
15	Pro Glu Trp Met Asn His Ser Val Leu Lys Asn Ile Val Ser Ile Leu 725 730 735		
20	Ile Ser Asn Phe Arg Asn Cys Ser Cys Leu Pro Pro Phe Gly Asp Leu 740 745 750		
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30	Tyr Val Glu Glu Val Asp Ile Asp Val His Ser Gly Phe Pro Thr Arg 770 775 780		
35	Ile Arg Phe Pro Ser Leu Arg Lys Leu Asp Ile Trp Asp Phe Gly Ser 785 790 795 800		
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45	Glu Glu Met Ile Ile His Glu Cys Pro Phe Leu Thr Leu Ser Ser Asn 820 825 830		
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55	Ser Phe Pro Glu Glu Met Phe Lys Asn Leu Ala Asn Leu Lys Tyr Leu 850 855 860		
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	Glu Ser Leu Pro Glu Glu Gly Leu Glu Gly Leu Ser Ser Leu Thr Glu 900 905 910		
	Leu Phe Val Glu His Cys Asn Met Leu Lys Cys Leu Pro Glu Gly Leu 915 920 925		
	Gln His Leu Thr Thr Leu Thr Ser Leu Lys Ile Arg Gly Cys Pro Gln 930 935 940		
	Leu Ile Lys Arg Cys Glu Lys Gly Ile Gly Glu Asp Trp His Lys Ile		

945

950

955

960

5 Ser His Ile Pro Asn Val Asn Ile Tyr Ile
965 970